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## FURTHER NOTES ON CLADONIAS. XI.

### *Cladonia pyxidata* and *Cladonia pityrea*.

BRUCE FINK.

*Cladonia pyxidata* is perhaps as easy to distinguish as any of our Cladonias, but it is sometimes confused with forms of *Cladonia fimbriata*, especially *C. fimbriata simplex*, which has rather short podetia and large cups for the species. Some of our best workers in American lichenology have also confused *Cladonia pyxidata* with immature and sterile specimens of *Cladonia deformis*. This species could likewise be confused easily with the northern alpine *Cladonia carneola*.

*Cladonia pityrea* is little known in America, and the writer can only state his own difficulties with the species. Of the forms submitted to Dr. Wainio, he had supposed the one from Iowa to be an unusual condition of *Cladonia cristatella*, two of those from Minnesota had been doubtfully referred to *Cladonia fimbriata*, and the others were recognized as very unusual Cladonias and sent without attempt at determination.

After a careful study of the effects of KOH on the thalli of Cladonias, the writer is convinced that in many instances these chemical tests are of considerable supplementary value in spite of differences due to age of thalli, differences in substrata, etc. However, in all of the species mentioned above, the KOH test is always or most usually negative or nearly so, so that its use in diagnosis, would be of very little or no value. In a supplementary paper, at the close of this series, the writer will give the results of his studies with KOH so that they may be used to supplement the diagnoses.

The specimen of *Cladonia pyxidata* that furnishes the illustration for this paper was collected by the writer at Tower, Minnesota, and determined by Dr. Wainio. That for *Cladonia pityrea* was collected near Hofheim, Germany, by L. Scriba, and determined by him as follows: "*Cladonia pityrea* (Flk.) Fr. inter 5. cladomorpham Floerk. et 6. hololepidem (Flk.) Wainio."

CLADONIA PYXIDATA (L.) Hoffm. Deutschl. Fl. 121. 1796. Primary thallus commonly persistent, composed of irregularly or digitately incised or lobate, flat, concave or rarely convex, commonly ascending, clustered or scattered squamules, which are 2-8 mm. long and 1.5-6 mm. wide, sea-green above or varying toward whitish or olivaceous, commonly lighter and sordidate below. Podetia arising from the surface of the primary thallus, 3.5-30 mm. long and 3-4.5 mm. in diameter; turbinate or tubaeform, erect; the cortex areolate, or verrucose, or subcontinuous toward the base; frequently more or less decorticate toward the top, rarely more or less squamulose; sea-green varying toward ashy or olivaceous; the decorticate portion white or ashy-brown; frequently closely clustered; cup-bearing. Cups 1-7 mm. in diameter, regular or irregular; on well developed podetia or the dila-

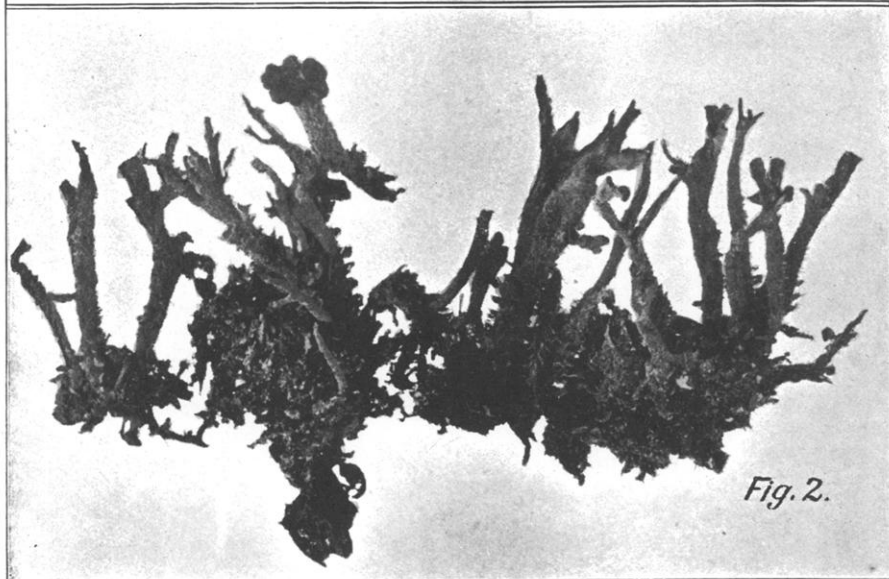


Plate VII—Fig. 1. *Cladonia pyxidata*  $\times 3$   
Fig. 2. *Cladonia pityrea*  $\times 2$

tion beginning just above the primary thallus; the cavity non-perforate and wholly or partly corticate; entire, dentate or proliferate from the margin, the proliferations one or more; the ranks 1-3. Apothecia medium sized, 1-4 mm. in diameter; solitary or conglomerate; regular or irregular; sessile on the margins of the cups or on longer or shorter pedicels; flat and thinly margined or more commonly convex and immarginate; commonly brown and ours all some shade of brown; scarcely common. Hypothecium pale or pale-brownish. Hymenium pale or pale-brownish below and brownish above. Paraphyses simple or rarely branched, commonly thickened and brownish toward the apex. Asci clavate. Plate VII. Fig. 1.

On earth or rocks, or rarely on old wood, usually in places only moderately moist and shaded. Examined by the writer from New Hampshire (G. K. Merrill and R. H. Howe, Jr.), Massachusetts (H. Willey), Maine (Clara E. Cummings and G. K. Merrill), Long Island (H. von Schrenk), New York (Carolyn W. Harris and E. A. Burt), Ohio (E. E. Bogue and M. Foltz), North Carolina (H. A. Green and determined as *Cladonia turgida*), Louisiana (A. B. Langlois), Missouri (Colton Russell), Minnesota, Iowa, Ohio, Washington and Alberta (Bruce Fink), Kansas (H. Willey), Nebraska (T. A. Williams), Colorado (C. F. Baker and H. H. Butler), Wyoming (Aven Nelson), Montana (R. S. Williams, L. H. Pammel and M. J. Elrod), New Mexico (F. S. Earle), Newfoundland (A. C. Waghorne), Alaska (Wm. Trelease), California (H. E. Hasse). Listed from Alabama by C. Mohr and from many localities in British America by J. Macoun. But Mr. Macoun has not recognized the first variety below, and doubtless some of his material belongs there. Willey and Calkins both list from Illinois, and Eckfeldt and Calkins from Florida. Wainio adds nothing to the general North American distribution given above.

The plants listed above are those which Dr. Wainio would place for the most part under *Cladonia pyxidata neglecta*, simply calling certain poorly developed forms by the specific name only. So far as examined by the writer the great majority of all specimens belong here, and this form should stand for the species.

CLADONIA PYXIDATA CHLOROPHAEA (Spreng.) Flk. Clad. Com. 70. 1828. The podetia more or less decorticate and sorediate toward the top.

Examined by the writer from Maine (G. K. Merrill), Massachusetts (R. H. Howe, Jr.), New York (Carolyn W. Harris), Iowa, Minnesota, Washington and Ohio (Bruce Fink), Tennessee (W. W. Calkins), Montana (M. J. Elrod), Colorado (C. F. Baker and L. H. Pammel), Newfoundland (A. G. Waghorne). Also listed from California by H. E. Hasse. Dr. Wainio's distribution adds Great Bear Lake, Miquelon Island and Pennsylvania. No doubt generally distributed over North America, but by no means so abundant as the species. Known in all the grand divisions.

CLADONIA PYXIDATA POCILLUM (Ach.) Wainio. Mon. Clad. Univ. 2:241, 1894. Primary thallus of rather large and thick, round-lobed or somewhat incised, closely adnate or slightly ascending squamules, which are more or less imbricated and closely packed into a commonly olivaceous or brownish crust. Podetia partly decorticate above, but not sorediate. Examined by the writer

from Minnesota and Alberta (Bruce Fink), W. W. Calkins lists from Illinois, T. A. Williams lists as common at Rapid City, South Dakota, H. Willey has listed from Massachusetts, H. E. Hasse from California, and J. W. Eckfeldt and W. W. Calkins from Florida. John Macoun gives several localities in British America, and Wainio's distribution indicated that the plant is confined almost exclusively to arctic or alpine regions. In view of this, the distribution in the United States, as given by American workers in recent years, may well be considered with careful re-examination of material. Found in Europe, Asia and Africa.

*CLADONIA PITYREA* (Flk.) Fr. Nov. Sched. Crit. 21, 1826. Primary thallus finally disappearing, when present composed of subdigitate, laciniate or crenate, involute concave or flat, ascending, clustered or scattered squamules, which are 1-3 mm. long and 0.5-2 mm. wide, sea-green or olivaceous above and white below and rarely more or less sorediate-granulose. Podetia arising from the surface of the primary thallus, 3.5-50 mm. long and 0.5-4 mm. in diameter, tubaeform, turbinate or subcylindrical; scattered or clustered into small patches; usually erect; the cortex subcontinuous and verrucose, or composed of small areoles, the areoles raised and contiguous, or the surface almost entirely decorticate and frequently sorediate-granulate; sometimes more or less squamulose; sea-green varying toward ashy or olivaceous, the decorticate portions commonly white, sometimes cup-bearing, the cupless and sterile apices obtuse or subulate, simple or digitately or irregularly branched. Cups 0.5-3 mm. in diameter, gradually or abruptly dilated, commonly more or less irregular, often oblique, the cavity rather shallow; the margin dentate, lacerate or proliferate, the proliferations one or more and the ranks 1-3. Apothecia small or medium sized, 0.5-4.5 mm. in diameter, often conglomerate; usually on short pedicels on the margins of the cups or at the cupless apices; the disk flat and thinly margined or becoming convex and immarginate; commonly brick-red (but ours are more commonly a dark brown). Hypothecium pale or pale brownish. Hymenium of same color or darker brownish above. Paraphyses simple or branched, commonly thickened and brownish toward the apex. Asci clavate or cylindrico-clavate. Plate VII. Fig. 2.

The only American specimens examined by the writer are a half dozen specimens submitted by him to Dr. Wainio, five from Minnesota and one from Iowa. Of the six, four were referred by Dr. Wainio to some of the various forms which he recognizes, and two, one from Iowa and one from Minnesota, were returned marked simply *Cladonia pityrea*. Dr. Wainio recognizes the species from Vancouver Island, Oregon, Massachusetts, South Carolina, Cuba, Porto Rico, Mexico, and one or two other small islands. This would give the plant a wide North American distribution, though it does not seem to be recognized by American lichenists, except those plants determined for the writer by Dr. Wainio. The species is doubtless a compound conception, but we can do no better, in the present state of knowledge, than to simply record below the three forms which Dr. Wainio has been able to recognize in the specimens sent him by the writer. While this treatment is far from sat-

isfactory, it is hoped that it will enable American workers to recognize the species and perhaps the forms given below. For other forms that are perhaps quite as likely to occur with us, the reader is referred to Dr. Wainio's Monograph.

*CLADONIA PITYREA PHYLLOPHORA* (Mudd.) Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, only 10–30 mm. in length, more or less squamulose, corticate and without soredia. But Dr. Wainio admitted here one of our forms, more or less decorticate. Specimens collected at Emo, on the northern boundary of Minnesota and on Oak Island, in the Lake of the Woods, were placed here by Dr. Wainio. Elsewhere recognized only in Europe.

*CLADONIA PITYREA SUBACUTA* Wainio Mon. Clad. Univ. 2: 355, 1894. Podetia cupless, 10–35 mm. in length, wholly granulose, or verrucose or areolate-corticate toward the base, almost devoid of squamules.

A single specimen from Emo was placed here by Dr. Wainio. Not known elsewhere from North America. More or less common in Europe.

*CLADONIA PITYREA CLADOMORPHA* (Flk.) Wainio Mon. Clad. Univ. 2: 255, 1894. Podetia cup-bearing, the ranks quite short (about 12 mm.), granulose or sorediate, often verrucose or areolate-corticate toward the base, devoid or almost devoid of squamules.

The great similarity of the last two varieties or forms is apparent enough from the descriptions, and Dr. Wainio referred the cupless podetia of the collection from Emo to the last variety above, and those having cups to the present one. The taxonomic value of such forms may be doubted, but we record them, leaving the future to decide as to their value. A specimen collected in California by Dr. Given (1869) and sent to the writer as *Cladonia pyxidata* was referred to the present form by Dr. Wainio. Except for these two forms submitted to Dr. Wainio, not recognized in America. Several European exsiccata have been placed here.

Miami University, Oxford, Ohio.

## NOTES ON RECENT LITERATURE II.

### Notes on the Physiology of the Sporophyte of *Funaria* and *Mnium*.

A. J. GROUT.

(R. H. True in Beihefte Bot. Centralblatt 19<sup>1</sup>: 34–44, 1905.)

This is an account of interesting experiments to discover the exciting cause of curvature of the seta in *Funaria hygrometrica* and *Mnium cuspidatum* Hedw. Dr. True concludes that "The young sporophyte, prior to the development of a distinct capsular rudiment, is either positively heliotropic or negatively geotropic, and tends to assume a perpendicular position which is fixed by the further development of the tissues. When in the young sporophyte the capsular rudiment has begun to develop, a sharp curvature appears just below the capsule, turning the capsular rudiment into the perpendicular position of either a positively geotropic or of a negatively heliotropic reaction."

Further experiments "seem to make it clear that in the case of *Mnium*,